IMPAC pyrometer with fiber optics for non-contact measurements of low temperatures on metals, ceramics, graphite etc. between 100 and 750°C

IP 140-LO

$C\epsilon$

- Temperature ranges from 100°C

- Short response times

- Extremely small spot sizes

- Built-in digital display with temperature indication

- Parameter adjustments via integrated key pad or interface

- Laser targeting light

- Test current output

- Interface RS232 / RS485 switchable

The **IP 140-LO** is a digital, highly accurate pyrometer with fiber optics for non-contact measurement of low temperature on metals, ceramics, graphite etc. from 100°C.

The instrument is equipped with a fibre and an exchangeable optical head. The fibre and optical head are unaffected by electromagnetical interferences (e.g. induction).

For optimal match of the instrument to the application 2 different optics are available.

The pyrometer is equipped with a built-in LC display and a small keyboard for setting of the pyrometer parameters. Additionally it can be connected to a PC via serial interface RS232 or RS485 (switchable). The standard analyzing and parametrizing software *InfraWin* is included in scope of delivery.

The pyrometer has a laser targeting light for exact alignment onto the measuring object.

Typical applications:

- metal moulds
- pressing tools
- bearings, bearing housings
- preheating
- annealing
- tempering
- sintering
- soldering
- rolling
- brazing
- normalizing

Technical Data

Temperature ranges:	100 to 650°C (MB 6.5) with 1 m fibre 110 to 670°C (MB 6.7) with 2 m fibre 130 to 750°C (MB 7.5) with 5 m fibre
Subrange:	any range adjustable within the temperature range, minimum span 51°C
Spectral range:	2 to 2.6 µm
Signal processing:	alternating light signal, digitized immediately
Accuracy: ($\varepsilon = 1$, $t_{90} = 1$ s, $T_{amb} = 23°C$)	below 400°C: 2°C above 400°C: 0.3% of measured value in °C +1°C
Repeatability: ($\varepsilon = 1$, $t_{90} = 1$ s, $T_{amb} = 23°C$)	0.1% of measured value in °C +1°C
Resolution:	interface and display: 0.1°C, analog output: < 0.03 % of temperature range
Response time t_{90}:	1.5 ms (with dynamical adaption at low signal levels) adjustable up to 10 s
Emissivity ε:	10 to 100% adjustable in steps of 0.1%
Analog output:	linear 0 to 20 mA or 4 to 20 mA, DC, switchable; load max. 500 Ohm
Test current output:	fixed 10 mA (for 0 to 20 mA analog output) or fixed 12 mA (for 4 to 20 mA analog output)
Power supply:	24 V AC/DC (14 to 30 V AC/DC) (AC: 48 to 62 Hz)
Power consumption:	max. 6 VA
Serial interface:	switchable inside the pyrometer: RS232 or RS485 addressable, half duplex; baud rate up to 115 kBd
Parameters:	adjustable at the instrument or via serial interface: emissivity; response time; analog output; address; baud rate; waiting time; °C or °F; setting of the maximum value storage; temperature sub range
Maximum value storage:	single or double storage; cleared by: preselected time interval or external deletion contact or via digital interface or automatically with the next measuring object
Isolation:	power supply, digital interface, analog output are galvanically isolated against each other and housing
Protection class:	IP65 (DIN 40 050)
Sighting:	Laser targeting light (max. power level < 1 mW, $\lambda = 655$ nm, CDRH class II)
Ambient temperature:	0 to 53°C at housing, optical head up to 200°C
Storage temperature:	-20 to 60°C
Dimensions [mm]:	see right side
Weight:	approx. 970 g (with 1 m fibre), approx. 1020 g (with 2 m fibre), approx. 1210 g (with 5 m fibre)
Mechanical tests:	vibration proof corresponding DIN EN 60068-2-6, shock proof corresponding DIN EN 60068-2-27
CE-label:	according to EU directives about electromagnetic immunity

CAUTION
LASER RADIATION
DO NOT STARE INTO BEAM
WAVELENGTH: 630-680nm
< 1 mW MAXIMUM
CLASS II LASER PRODUCT

Advantages of the Digital Signal Processing

The signal processing of series 140 pyrometers is fully digital, i.e. the detector signal are digitized immediately and digitally processed. With this technique an extremely high accuracy and repeatability is achieved.

Accuracy: The high accuracy is achieved by the digital linearisation of the sensor output as well as the digital compensation for the ambient temperature.

Temperature range: Due to the digital technique any temperature sub range within the full temperature range can be set. The analog measuring output corresponds automatically to the selected sub range. This setting of a sub range does not effect the high accuracy and repeatability.

Output: The analog measuring outputs 0 to 20 mA or 4 to 20 mA are selectable as well as the serial digital interfaces RS232 or RS485. Additionally the interface allows the controlling of the pyrometer via PC.

Bus control: The serial interface RS485 facilitates the integration of the pyrometer into existing field bus systems.

Calibration: A calibration of the series 140 pyrometer can be done with help of a PC and a calibration source without opening the housing.

Converter

Fiber with green mark on instrument's side

Mounting rail

Type label

Optical head

Targeting light button

LC-Display for temperature or paramters, keyboard for parameter settings inside the instrument

Power supply, analog output, digital interface

Optics and Laser Aiming

Depending on the application the instrument will be delivered with a small or a large optical head. The selection of the optical head depends not only on its size but also on the required spot size (size of the measuring object) and the measuring distance.

Optical head I: With the very small dimensions the optical head I is suited for use in confined spaces. The optics is adjusted to one of the measuring distances mentioned in the table. The mentioned spot size will be achieved in exactly this distance (other distances on request).

Optical head II: The optics II is bigger, but smaller spot sizes can be achieved. Two designs are available, fixed adjusted or focusable:
Similar to optics I the fixed adjusted type is adjusted to one of the measuring distances mentioned in the table (other distances on request).
The focusable type is available for 3 different distance ranges. Each measuring distance can be adjusted within the mentioned limits to achieve the smallest spot size in the required distance.

Distance „a" is specified from the front of the lens
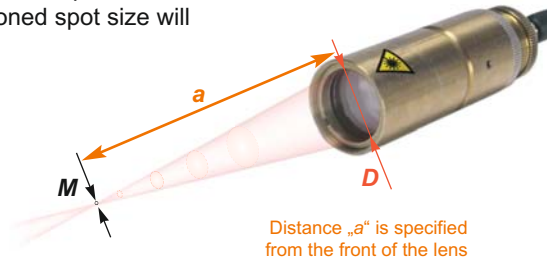
| Optical head		Measuring distance a [mm]	Spot size M_{90} [mm]	Aperture D [mm]
Type I		120	3.4	7
		260	8.5	7
Type II (fixed adjusted)		87	1.1	17
		200	2.5	15
Type II (focusable)		88 to 110	1.1 to 1.6	17.5 to 15.5
		95 to 129	1.3 to 2.1	16.5 to 14.5
		105 to 161	1.6 to 2.8	15 to 13.5

Fiber

The transmission between optical head and converter is done via 0.6 mm mono fibre with a stainless steel protection hose. The optical head contains only the lens, the sensor and the electronics are located in the converter. Fiber and optical head can be used in ambient temperatures up to 200°C without additional cooling (fibre at converter side max. 125°C). The temperature of fibre and optical head must be at least 30°C lower than the measuring temperature. The length of the fiber depends on the temperture ranges (see technical data)
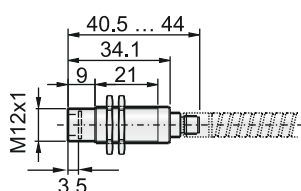
Minimum bending radius: For short time: 150 mm
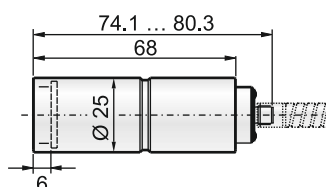   Permanent: 500 mm
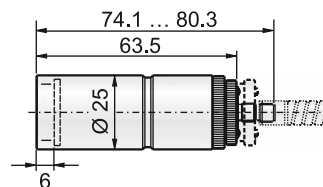
Dimensions

Pyrometer housing:
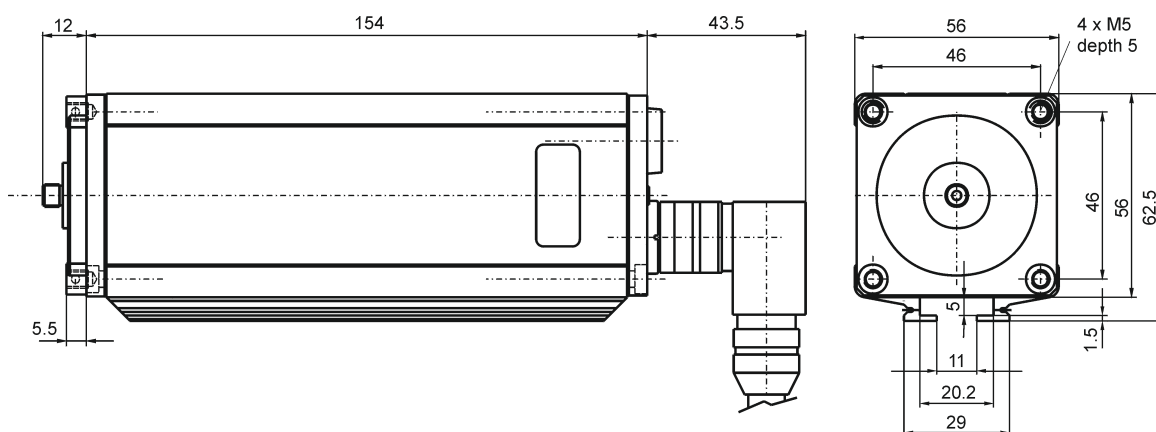
Optical head type I:

Optical head type II:
(fixed adjusted)

Optical head type II:
(focusable)

All dimensions in mm

Reference Numbers

Pyrometers:

3 875 910	100 to 650°C	(MB 6.5) with 1 m fibre
3 875 930	110 to 670°C	(MB 6.7) with 2 m fibre
3 875 920	130 to 750°C	(MB 7.5) with 5 m fibre

Scope of delivery: Converter, fiber, one selectable optical head, works certificate, *InfraWin* operating and analizing software, user manual. A connection cable is not included in scope of delivery.
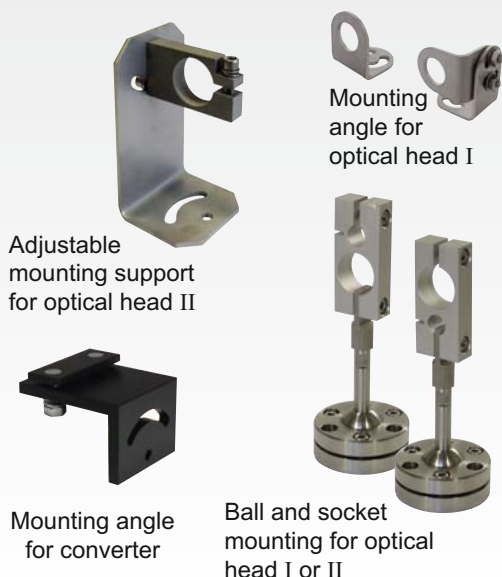
Ordering example: Pyrometer with reference number, optical head (I or II) with measuring distance (e.g. optical head I, a = 120 mm), connection cable (e.g.3 820 330)
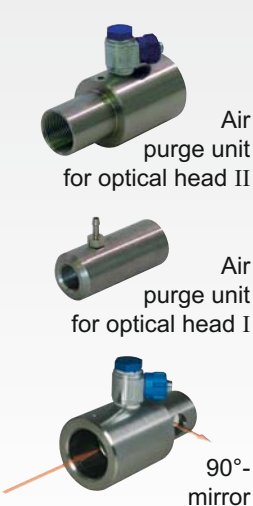
Accessories:

3 820 340	connection cable, length 5 m, 90° connector		3 835 170	air purge for optical head I
3 820 530	connection cable, length 10 m, 90° connector		3 835 180	air purge for optical head II
3 820 540	connection cable, length 15 m, 90° connector		3 835 240	90° mirror for optical head II
3 820 830	connection cable, length 20 m, 90° connector		3 852 290	Power supply NG DC; 100 - 240 VAC
3 820 840	connection cable, length 25 m, 90° connector			$\Rightarrow$ 24 V DC, 1 A
3 820 550	connection cable, length 30 m, 90° connector		3 890 640	LED digital display DA 4000-N
3 820 330	connection cable, length 5 m, straight connector		3 890 650	LED digital display DA 4000: with 2 limit switches
3 820 500	connection cable, length 10 m, straight connector		3 890 560	LED digital display DA 6000-N: with possibility for pyrometer parameter settings for digital IMPAC pyrometers; RS232 interface
3 820 510	connection cable, length 15 m, straight connector			
3 820 810	connection cable, length 20 m, straight connector			
3 820 820	connection cable, length 25 m, straight connector		3 890 520	LED digital display DA 6000; DA 6000-N additional with 2 limit switches and analog input and output
3 820 520	connection cable, length 30 m, straight connector			
3 834 280	mounting angle for converter		3 826 500	HT 6000, portable battery driven indicator and instrument for pyrometer parameter setting
3 834 370	mounting angle for optical head I (fixed)			
3 834 380	mounting angle for optical head I (adjustable)			
3 834 390	ball and socket mounting for optical head I or II			
3 834 230	adjustable mounting support for optical head II			

Overview Accessories

Mounting:

Adjustable mounting support for optical head II

Mounting angle for optical head I

Mounting angle for converter

Ball and socket mounting for optical head I or II

Air purge units:

Air purge unit for optical head II

Air purge unit for optical head I

90°-mirror

Electrical accessories:

LED-large display

LED digital display DA 6000-N

Power supply NG DC

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